

Nonpoint Source Funding for the Upper Animas River 1991-2013

Grant#	Fiscal Year	Title	319 \$	total \$	Notes	Description
00863491	1991	Project: ANIMAS TARGETING	\$96,252	\$160,420		This project is the first phase of the effort to characterize the metals loadings in the Upper Animas basin, in order to determine where and how to treat the loadings. Since this is the first phase, a final report is not available, but will be referenced in future phases. Identification of site/area specific sources of metal loadings would rely on up-stream/down-stream comparisons. Sampling locations would be designed to bracket suspected sources of relatively diffuse inputs as well as directly quantify loadings from discreet sources such as draining mine shafts. The study is designed to provide resource managers with the necessary informatin to successfully guide resource restoration decisions. The output of the study would: a) determine whether contaminant transort in the study area is dominated by a specific number of relatively discreet sources; or b) is driven by inputs from numerous diffuse areas. If the data supports outcome, re-evaluation of current resotration goals would be indicated. Sites would be prioritized for remedial projects based on environmental impacts, relative contribution to loadings, feasibility, cost/benefits, etc. Sampling will focus on parameters pertinent to trace metal transport and instream toxicity: discharge, temperature, total suspended solids. pH, hardness, alkalinity, and total and dissolved analysis for the following metals: aluminum, cadium, copper, iron, lead, manganese, nickel, selenium, silver, zinc. If initial sampling indicates that somemetals are below detection limits, then they will be omitted from future analysis. At sites targeted for mroe detailed water quality monitoring, the following additional anions/cations will be included for analysis: chloride, flouride, ammonia, nitrate, nitrite, total phosphate, bicarbonate, potassium, sodium, and sulfate. Sampling would be stratified over two cycles of the annual hydrograph (fall 1991 through summer 1993) and would be designed to target critical flow periods which prior studies have documented as times of the greatest metal loadings and/or potential toxicity to aquatic life; specifically snowmelt high-flow, summer storm events, and fall low-flow.
00863492	1992	Project: COLORADO NPS BASE PROGRAM	\$195,972	\$195,972		Funding includes Upper Animas Targeting lab support plus other staffing and support.

00863492	1992	<u>Project: Animas River Targeting</u>	\$29,415	\$29,415	This project is the second phase of a study initiated in Fy91. The Animas River is a major tributary to the San Juan River in southwestern Colorado. The study area is primarily located in the upper Animas River basin above the historical mining center of Silverton. The objective of the study is to quantify sources of metal loadings in the upper Animas River and determine the potential for resource restoration. The initial phase of the project was begun in September 1991. Flow and water quality data were collected at 163 suspected loading areas from the headwaters of the Anima River downstream approximately 24 miles. Sampling was conducted during a prolonged storm event which will provide critical storm event data. Sampling in Fy92 will continue water quality analysis during spring high flows, midsummer, and fall conditions. Biological data collection will occur at a limited number of stations during fall 1992. Objectives of the study are: 1. Characterize current chemical, biological and physical conditions in the upper Animas River. 2. Quantify the areas of greatest metal loading and determine the potential for water quality improvements sufficient to allow naturally reproducing trout populations. 3. Prioritize sites for remedial projects based on environmental impacts, relative contribution to loading, feasibility, and cost/benefits.
99818694	1994	<u>Project: ANIMAS RIVER FEASIBILITY STUDY</u>	\$18,341	\$18,341	This project was proposed to provide assistance to the Animas River stakeholders group to determine the feasibility of improving water quality in the Animas Basin. The funding was approved by EPA with the stipulation that a workplan would be submitted once priorities for the use of these funds are determined by the stakeholder's group.
99818694	1994	<u>Project: Animas River Stakeholders Group Admisistration</u>	\$35,000	\$114,334	The Watershed Coordinator is the sole existing employee of the Animas River Stakeholders Group which was developed as a collaboration of agencies, corporations, land owners, local citizens, and citizen groups with the mission to substantially improve water quality, aquatic life and habitat throughout the Animas Watershed. Heavily impacted by metals contamination, the watershed contains over 1000 abandoned mine-related sites in need of assessment, characterization and evaluation for site prioritization, voluntary cleanup encouragement, and cost-effective remediation. The coordinator's position is necessary to maintain continuity among the large number of participants, planning and coordination of activities, and issue identification and resolution. The coordinator is the focal person for consolidating watershed issues, gathering and disseminating information, and providing continuity and balance to the scientific, political and social contributions into the process of remediation planning and implementation. We are trying to develop enough funds to ensure the position for a 2 year period.

99818695	1995	<u>Project: PLACER GULCH MINING REMEDIATION</u>	\$96,300	\$161,255		The Mining Remedial Recovery Company (MRRC) owns the Sunbank property on Placer Gulch in the Upper Animas Basin. This inactive mine has a draining adit which contributes metals pollution and mine wastes which leach metals and degrade the Placer Gulch riparian zone. The project will improve water quality by removing mine wastes from drainage areas and neutralize acid mine water using limestone backfill of the adit. The project is located at an elevation ranging from 11,600 to 13,000 feet. The site is accessible for a limited summer/early fall period. Equipment for mine remediation work will be mobilized as weather allows. Waste dump areas in the gulch will be relocated, graded, and covered with top soil for revegetation. The mine adit area will be improved and the adit backfilled with limestone to neutralize the draining water. Regraded mine waste area will be revegetated (about 4 acres), and the water quality will be monitored for 2 years after the remediation work. A local education and outreach effort will also be included in association with the on-going Animas Watershed initiative, which includes citizens, agencies, mining interests, and state and federal land managers.
99818695	1995	<u>Project: ANIMAS BASIN- MINERAL CREEK FEASIBILITY</u>	\$14,971	\$24,971		The Division of Minerals and Geology is evaluating mine sites in the Mineral Creek subbasin of the Animas watershed to see where metals pollution reduction can be made cost-effectively. Water quality data gathered over the last four years in the Animas watershed has been analyzed to define metals loading in each of the three major tributaries; Mineral Creek, Cement Creek, and the Upper Animas. Working with the State and EPA in recent years, the local watershed stakeholders group has decided to pursue cost-effective mine site clean-up projects where mine drainage water is not being treated and waste rock or tailings in the drainage can be regraded/remediated. The evaluation is being coordinated with data and projects being done by Sunnyside Mine, which has recently shut down and is negotiating NPDES permit inactivation and reclamation requirements for final close-out of mining operations on Cement Creek. Approved mine waste and drainage control BMP's will be used to reduce acid mine pollution at selected sites after this feasibility study is complete.
99818695	1995	<u>Project: STATE NPS MONITORING - LABORATORY COSTS</u>	\$9,548	\$15,913	all for Mineral Creek feasibility study	This 319 grant is part of the funding for the Mineral Creek feasibility study in the Animas Basin (see Grant CO-00998186950, Project 11). The funds are budgeted for laboratory cost of testing water quality samples from Mineral Creek. The information will be used to determine site remediation alternative for water quality improvements.

99818696	1996	<u>Project: ANIMAS BASIN MINE WASTE CONTROL PROJECT</u>	\$89,476	\$448,276		This project addresses key mine waste sites in Mineral Creek, tributary to the Animas River. The subbasin targeting approach for identifying and reducing metals sources was adopted by the stakeholders group and this part of the watershed is the first phase of assessment and remediation. The goal of the project is to successfully demonstrate the use of hydrologic controls to prevent metals leaching at 5-8 sites targeted by the Animas River Stakeholders Group. Assessment done under the FY 95 319 targeting grant of \$15,000 has narrowed the selected sites to the following five: Carbon Lake near Red Mountain Pass Brooklyn Mine on Brown's Gulch Bonner Mine on the Middle Fork of Mineral Creek Bandora Mine on the South Fork of Mineral Creek North Star Mine on the Mineral Creek mainstem west of Silverton The key work tasks are to design hydrologic controls and revegetation, prepare bid specifications, construct controls/BMP's such as run-on diversion trenches monitor the project sites for two years, provide information and education on the project, and submit a final report in 1998. Mine wastes are left in place for the most part and drainage patterns are altered to reduce metals transport
99818696	1996	<u>Project: ANIMAS TARGETING PROJECT - CEMENT CREEK</u>	\$46,199	\$76,999		This project is a continuation of the Animas River Targeting Projects, with the primary target of Cement Creek. This proposal is to complete the feasibility investigations and pre-engineering evaluations in Cement Creek and any remaining data gaps for Mineral Creek. This work is a critical link in identifying the sites that will be considered for water quality improvements to meet the goals of attaining aquatic life uses in the Basin. The stakeholders group will be heavily involved in all the tasks identified in the proposal through either oversight or direct involvements. This project is also to characterize the existing stream geomorphic conditions of sediment loading, embeddedness, fish habitat, and other parameters necessary to ensure future remediation efforts will be appropriately implemented.
99818696	1996	<u>Project: ANIMAS RIVER TARGETING CONTINUATION PROJECT</u>	\$45,181	\$75,333		This project is a continuation of the Animas River Targeting Project. It will concentrate on remedial potential of sites in the Upper Animas Watershed.
99818696	1996	<u>Project: Animas Targeting Laboratory Costs</u>	\$39,984	\$39,984		
99818698	1998	<u>Project: ANIMAS RIVER TARGETING CONTINUATION</u>	\$64,500	\$107,500		This project will provide in-depth identification, water quality information, technical and economic feasibility studies, and will lead to the prioritization of specific sites for remediation in the Upper Animas Watershed between Elk Park and Eureka. This project is a continuation of the Animas River Targeting Project, and will conclude the site characterization and targeting program for the Upper Animas.
99818698	1998	<u>Project: ANIMAS TMDL FRAMEWORK DEV.</u>	\$86,400	\$204,000		No description. I think this is the project that resulted in a Use Attainability Analysis.

99818698	1998	Project: Upper Animas Targeting	\$45,181	\$65,868		This project is a continuation of the Animas River Targeting Project. It will concentrate the remediation potential of sites in the Upper Animas River watershed.
99818699	1999	Project: SILVER WING MINE NON-POINT SOURCE PROJECT			project discontinued. Budget omitted.	The project will collect effluent from a draining mine adit (portal) that is currently flowing across a heavily mineralized dump, place the effluent in a lined ditch, and convey the effluent to a lined sedimentation pond. The effluent will then pass to one of two full scale demonstration process reactors for metals removal 1)--Ion exchange/electrical regeneration and metals precipitation unit; or 2)--Contained bioreactor vessel. The cleaned effluent will then be discharged to the Animas River. It is expected that the active reactor will remove at least 85% of the dissolved copper, zinc and cadmium and a significant amount of the dissolved iron and manganese from the mine drainage. It is expected that the bioreactor will also result in significant removal of metals, but at lower performance levels. The project will include collection of performance information from both process reactors and evaluate total removal of metals from the mine drainage, and operation and maintenance requirements for the reactors. The mine site is located in a remote area and is inaccessible for six months of the year due to deep snow and avalanches. The parallel active/passive reactor combination is designed to address the remote site location, limited access problem by operating the active reactor when the site is accessible and the passive reactor when the site is inaccessible.
99818699	1999	Project: SURFACE WATER INFILTRATION CONTROLS	\$125,000	\$237,333		Heavy metal contamination associated with draining historic hardrock mines in the headwaters of the Animas River, Cement Creek, and Mineral Creek watersheds impacts water quality and aquatic life throughout the Animas River. The results of synoptic water quality assessments to identify areas of metal contributions within the basin indicate that two major contributors to metals loading are the draining abandoned Koehler tunnel at the head of Mineral Creek, and the draining North Star mine in lower Mineral Creek. Based on recently completed detailed site characterization, these two mine discharges have a high potential for preventative treatment- Both discharges appear to derive a large part of their flows from surface water infiltration into the mine workings at discrete high-permeability structures. At the Koehler mine, a trans-basin diversion ditch carries irrigation water above underground workings, in close proximity to a series of caved stopes and breccia-pipe structures which connect in the subsurface with the Koehler tunnel. At the North Star Mine, a steep gradient stream flows directly across a collapsed, debris-filled stope constructed under the stream bed. Preliminary characterization of the Mogul Mine in the Cement Creek Drainage suggests much of the discharge stems from inflows to a drift which crosses under the North Fork of Cement Creek. These physical situations are amenable to source controls approaches to reduce or control the mine discharges by diverting or sealing the inflow structures or zones, thus preventing clean inflows from contacting and flushing through the mine workings.

99818699	1999	Project: CEMENT CREEK MINE WASTE CONTROL	\$93,779	\$256,979	This project is designed to implement hydrological controls (using best management practices) on abandoned mine waste for specific sites in the Cement Creek drainage of the Animas river. Mine waste leach tests and characterization of impacts to nearby streams have recently been completed (Animas NPS Targeting Program). Sites which will both significantly reduce non-point source metal loads to streams and benefit the Animas stakeholder process by initiating private land owner involvement will be chosen through a site prioritization process to be completed in July/August of 1998.
99818600	2000	Project: ANIMAS MINE WASTE CONTROL CONTINUATION CARBON LAKES	\$145,360	\$267,267	PROJECT DESCRIPTION: This project will consist of two parts. Part 1 will remove the remainder of the mine waste from the Carbon Lakes mine dump to placement within Sunnyside Gold's tailings pond # 4. This highly mineralized waste requires neutralization with limestone at the approximate rate of 268 tons lime/1,000 tons waste. The streambed where the wastes presently reside will be reconstructed and re-vegetated. Due to quantity under-estimates from two separate agencies, only half of the waste could be removed in July, 1999 before funds ran out. Funding is requested to complete this high priority project. Part 2 is immediately upstream of the Carbon Lakes (Congress) mine. Geophysical data indicates that water from the Carbon Lakes irrigation diversion ditch is likely infiltrating the old working of the San Antonio mine which shares a direct connection with the acid mine drainage from the Kohler tunnel. Data indicates the Kohler drainage carries the largest load of metals from any mine in Mineral Creek and has first priority status for remediation. A water conveyance structure will be installed to collect and transport the water beyond infiltrating water courses into the old mine workings.
99818601	2001	Project: Animas Watershed Coordinator's Position	\$40,831	\$136,102	Funding of the Animas River Stakeholders Group coordinator position for a two year period.
99818601	2001	Project: Handies Peak	\$135,000	\$225,000	This project is designed to implement hrdrological controls using best management practices on abandoned mine waste for sites located in the headwaters of the Animas River above Eureka.

99818602	2002	Project: Red Mountain Mine Waste Control Project	\$227,740	\$379,576	The Animas River Stakeholders Group (ARSG) has recently completed a Use Attainability Analysis (UAA) of the Upper Animas Watershed above Durango, CO (see Attachment 1A). Stream segments 2, 3a, 3b, 4a, 4b, 7, 8, and 9b of the Animas River are given high priority status for remedy and TMDL plan development on the 303(d) list. The plan for over 20 TMDL's will be approved for by June, 2002. Mine waste sites have been prioritized on the basis of leach testing of all significantly mineralized wastes throughout the basin. Through earlier NPS 319, private industry, and Colorado State Severance Tax funds the Carbon Lakes, Galena Queen, and Hercules mine dumps (all high priority sites) have been moved off site, to be milled and the metals sold. This new project will remediate two sites having equal priority status in the watershed. Wastes will either be moved off site, to a permitted disposal facility (possibly to be milled), or remediated in place, or both. Only mine wastes of the highest metal concentrations or wastes in streams will be moved off site for disposal. Wastes with lower metal concentrations may have one or more hydrological controls implemented to reduce their leachability into nearby streams. These Best Management Practices may include runoff/runoff controls, consolidation, neutralizing amendment, capping, and revegetation.
99818603	2003	Project: Animas River Characterization Project (Segment 3a)	\$174,950	\$292,050	Water quality will be characterized in Animas River Segment 3a to determine sources of pollutants to the Animas along this reach. This is an important piece of the TMDLs for the river.

99818603	2003	Project: Priority Mine Site Waste Removal	\$163,500	\$272,500		The Animas watershed is heavily impacted by toxic metals and acids derived from both natural and historic mining related sources. The upper Animas basin comprises 186 square miles of highly mineralized, high altitude mountains which are the headwaters to the Animas River. Nearly all streams in the Upper basin above Silverton, San Juan County, plus the Animas main stem as far as Durango are listed "high priority" on the State's 303(d) list (Figure 2). Metal toxicity and acidity have resulted in many miles of streams devoid or severely reduced of aquatic life and habitat. Although the local economy is slowly improving, San Juan County continues to have the highest unemployment rate and lowest per capita income in Colorado. This project will help attain our goals while engaging locals in voluntary and contractual roles. The Animas River Stakeholders Group (ARSG) is a collaboration of private and public entities (Appendix A) with nine years experience in site monitoring, characterization, and remediation feasibility evaluations. The Stakeholder's full body of work which includes the evaluation of all mine sites within the Upper Animas basin was presented the Animas Use Attainability Analysis (UAA) . All mine waste sites were ranked by their potential metal and acid loading capacities and their feasibility for remediation. The UAA recommended adoption of new "goal-based" stream use classifications and numeric standards based upon anticipated reductions brought about through a comprehensive remediation plan. It is said that this work has provided one of the most comprehensive analyses of any watershed in our nation, setting a benchmark for collaborated assistance to regulatory decision making
99818603	2003	Project: Post Remediation Assessment: Pre and Post Remediation Assessments for the Animas Watershed	\$13,479	\$43,479	Split- funded with FY04	See description below.
99818604	2004	Project: Post Remediation Assessment: Pre and Post Remediation Assessments for the Animas Watershed	\$26,842	\$30,125		This project is situated on the Animas River and its tributaries in Southwest Colorado. Historic mining has contaminated many miles of tributaries and the main stem of the Animas River with trace metals and high acidity. Several stream segments are impaired and 29 TMDL's have been allocated to these segments. Contamination is coming from the Upper Animas above Silverton, mostly from within the Silverton volcanic caldera. Fish and macroinvertebrate population are severely depressed where present while some stream segments have no aquatic life. Over 1500 mines and several large mills populate the Silverton mining district.
99818604	2004	Project: Upper Animas Mine Waste Control	\$4,041	\$6,735		Improve water quality in the Animas Watershed by reducing metals and acidity arising from the leaching of highly concentrated mine wastes.



99818605	2005	<u>Project: Anglo-Saxon/Porcupine Assessment and Characterization</u>	\$14,023	\$23,371		The abandoned Anglo Saxon and Porcupine mines are presently collapsed at the surface entrances. Both mines drain large quantities of metals into nearby Cement Creek, headwaters of the Animas River. The Animas River Stakeholder's Group (ARSG) has prioritized these mines for remediation, which will help meet TMDL's and stream standards in Cement Creek and the Upper Animas.
99818605	2005	<u>Project: Upper Animas Mine Drainage Control Phase II, Mine Waste Phase II and Planning Update</u>	\$118,545	\$118,545		See 2007
99818606	2006	<u>Project: Upper Animas Mine Drainage Control - Phase I</u>	\$26,756	\$44,594		This project will investigate 3 mines to determine the feasibility of installing concrete bulkheads to impede drainage from the portals. The most feasible site will be chosen to engineer and construct an appropriate concrete structural bulkhead. The sites to be investigated have been fully characterized and ranked for their contributions of metals and acidity to the Animas watershed. Underground investigations will be conducted to determine the competency, fracturing, pressure grouting requirements and other features necessary for successful bulkhead construction. Bidding documents will be developed for a competitive bidding process. It is the intention of this project to install at least one bulkhead. Construction is expected during a summer season. Any remaining drainage will be monitored after remediation to determine bulkhead effectiveness. The Animas River Stakeholders Group will use the site effectiveness evaluation and engineering process developed to further future mine drainage cleanups within and outside the watershed.
99818606	2006	<u>Project: Upper Animas Mine Drainage Control Phase II, Mine Waste Phase II and Planning Update</u>	\$192,604	\$306,450		See 2007

99818607	2007	Project: Upper Animas Mine Drainage Control Phase II, Mine Waste Phase II and Planning Update	\$33,994	\$148,801		This project will investigate 3 mines to determine the feasibility of installing concrete bulkheads to impede drainage from the portals. The most feasible site will be chosen to engineer and construct an appropriate concrete structural bulkhead. The sites to be investigated have been fully characterized and ranked for their contributions of metals and acidity to the Animas watershed. Underground investigations will be conducted to determine the competency, fracturing, pressure grouting requirements and other features necessary for successful bulkhead construction. Bidding documents will be developed for a competitive bidding process. It is the intention of this project to install at least one bulkhead. Construction is expected during a summer season. Any remaining drainage will be monitored after remediation to determine bulkhead effectiveness. The Animas River Stakeholders Group will use the site effectiveness evaluation and engineering process developed to further future mine drainage cleanups within and outside the watershed.
99818613	2013	Bullion King Mine	\$221,355	\$465,899	newly approved. Not yet int GRTS.	This project will develop and implement a mine waste remediation plan for the Bullion King mine which is a significant source of heavy metals and acid that impacts Mineral Creek, a major tributary to the Animas River. Bullion King has been fully characterized and determined to be the highest ranking remaining mine waste site that contributes metals and acidity to Mineral Creek. Several previous remediation projects in the Mineral Creek watershed have resulted in near attainment of water quality goals. Successful reduction of metal contributions from the Bullion King should result in compliance with adopted water quality standards. The project, from design to construction completion, is expected to take two summer seasons. The site will be monitored before and after remediation to determine effectiveness of the implemented BMP's. The Animas River Stakeholders Group (ARSG) will showcase the site to demonstrate BMP applicability and cost effectiveness.
		<b>totals</b>	\$2,670,519	\$4,993,387		